



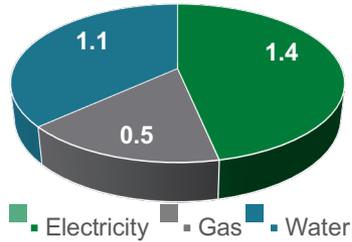
Expertise Applied | Answers Delivered

Smart Metering

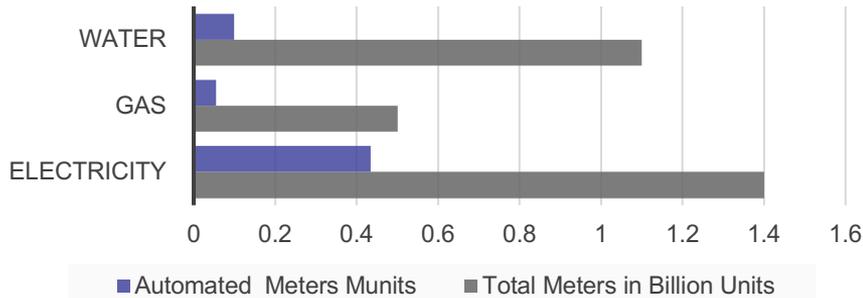
Supporting the Rollout & Success of IoT

Global Smart Meter Overview

Global Smart Meter Size in Billions Units



Global Automated Meter conversion rate in 2017



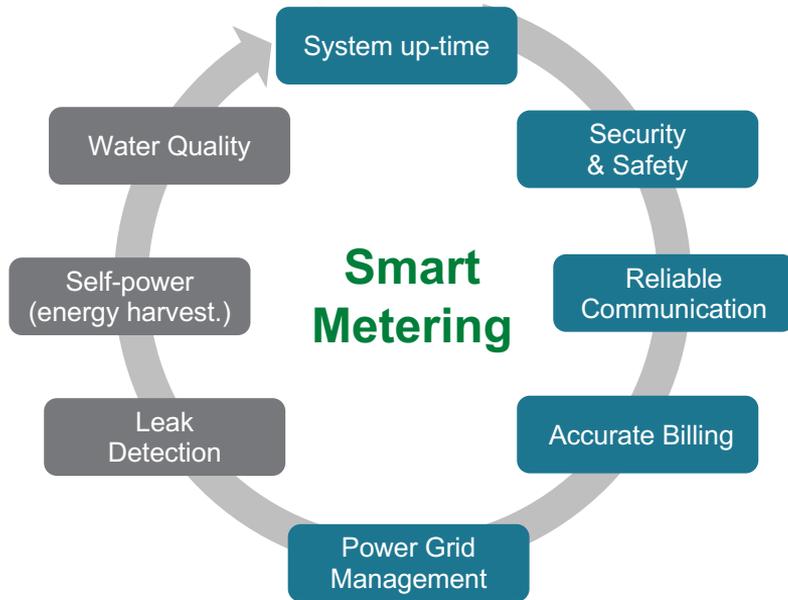
Source: IHS Smart Metering 2017 including China

Market Drivers	Electricity	Gas	Water
Outage notification	✓	✓	✓
Operational Cost Savings	✓	✓	✓
AMI* compatible	✓	✓	✓
Accurate Billing	✓	✓	✓
Distributed energy Capacity Management	✓		
Natural resource scarcity		✓	✓
Pipeline safety		✓	
Leaks, Revenue losses		✓	✓

* Advanced Metering infrastructure (AMI)

Global smart metering market poised for continued growth

Littelfuse & Metering: Changing from No-electronic Content to Most Key Functions Based on Dependable Electronics



Littelfuse: Key know-how to help customers implement more reliable & safer smart meters

- Electric transients & overcurrent protection
- Anti-tamper solutions
- Flow measurement devices
- Low power consumption sensors
- Load switching & energy pulse out
- Over-temp detection & temp measurement
- Power management

Littelfuse can help with cross-functional system-level expertise & application testing

Smart Electricity Meter

Anti-tamper: ■

- Reed Switches and Hall Effect Sensors

Metrology System Unit: ■ ■ ■

- TMOV/MOV Lightning Surge/Induction
- Cartridge Fuse Overcurrent Protection
- TVS Diode Overvoltage Protection
- SMPS* Opto-isolator Feedback
- SMPS* FET
- NTC Thermistor Temperature Sensing

Communication Interface: ■ ■

- RF ESD Protection
- Sidactor Wired interface protection
- Opto-isolator Galvanic Insulation

Display: ■

- RFID Analog Front End

I/O Protection and Control: ■ ■

- SSR** Load Switching
- Cartridge Fuse Overcurrent Protection
- TVS, SMD MOV Overvoltage Protection
- Fuse or SSR** Overcurrent Protection

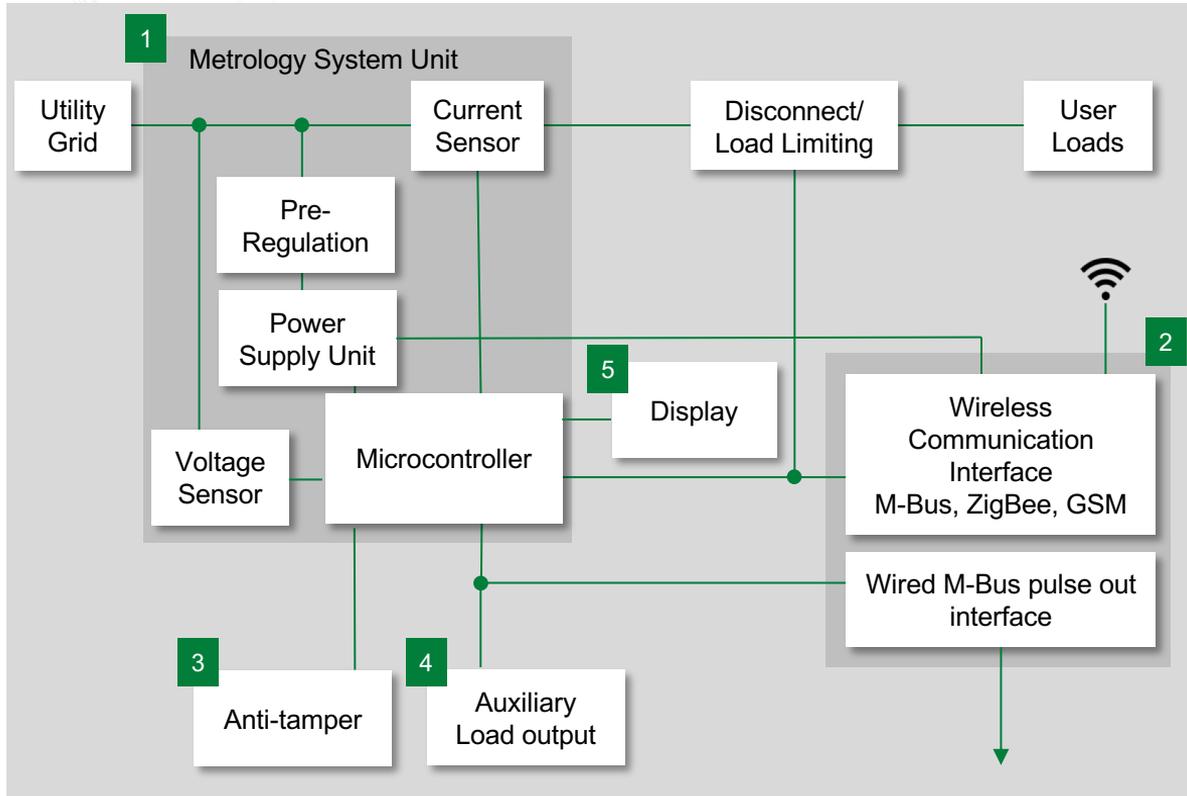


■ Protect ■ Control ■ Sense

* Switched-mode Power Supply

** Solid State Relay

E-metering High Level Block Diagram



	Technology	Series
1	MOV	Ultra MOV, CIII, TMOV
	Cartridge Fuse	215 & 514 Series
	TVS Diode	SMAJ, SMBJ
	Opto-Isolator	CPC1303, LIA130
	NTC	MELF Style, End-Banded Chip
2	FET SIC FET	IXTP3N100P, IXTP4N65X2 LSICMO170E1000
	Pre-Regulation FET	IXTY2N65X2
	ESD	SESD0402x
	Opto-Isolator	CPC130x, CPC590x
	Sidactor SEP, SESD	SEP0xx, LC03-3.3
3	Solid State Relay	PLA192, CPC139x, CPC19xx
	Hall Effect Sensor	MX887DHTR
	Reed switch	MDSR-10
4	Solid State Relay	PLA192, CPC139x, CPC19xx
	Fuse or SSR	Cartridge 216 Series CPC15xx
	TVS, MOV	SMCJ, SM7
5	RFID	NCD1300

Smart Water and Gas Meter

Battery & Interface Panel: ■

- SMD PPTC or Fuse for Overcurrent Protection
- ATEX Fuse Overcurrent Protection (gas meter)
- TVS Diode Overvoltage Protection

Anti-tamper: ■

- Reed Switches or Hall Effect Sensors

Communication Interface: ■ ■

- RF ESD Protection
- Sidactor Wired Interface Protection
- Opto-isolator Galvanic Insulation
- SSR** Pulse Output Indicating Gas or Water Consumption



Display: ■

- RFID Analog Front End

Safety Valve: ■

- SSR** Valve Control

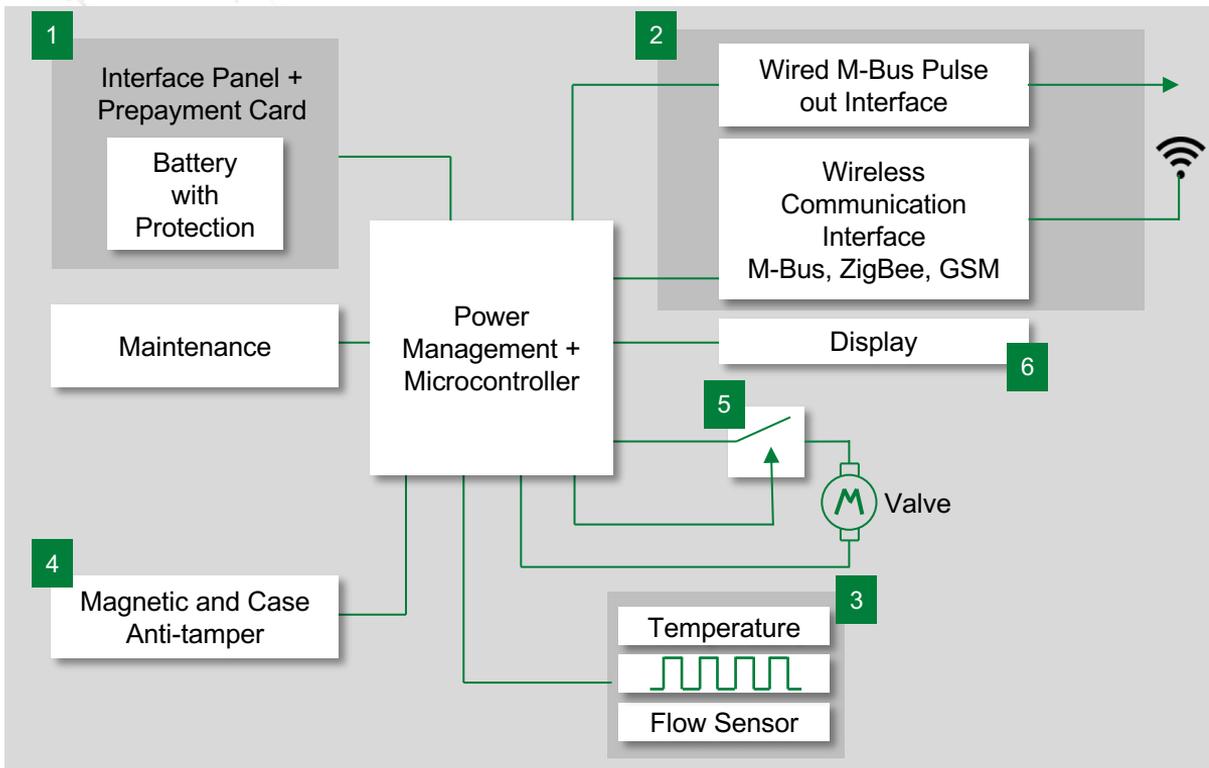
Flow Measurement: ■

- NTC Thermistor Temperature Sensing
- Reed Switches

■ Protect ■ Control ■ Sense

** Solid State Relay

Gas and Water Meters Share Many Functional Blocks



	Technology	Series
1	Fuse PPTC	Atex 259/304, 437 Series Femto, Nano Series
	TVS Diode	SMBJ, SMCJ
2	SESD Array	SESD0402x
	Opto-isolator	CPC130x, CPC590x
	Sidactor, Diode Array	SEP0xx, LC03-3.3
	Solid State Relay	LCA182S
3	NTC	MELF style, End-Banded Chip, Custom sub-assembly
	Reed Switch	MDSR-10
4	Reed Switch	59166, MDSM-4
5	Solid State Relay	LCA712
6	RFID	NCD1300

Select Standards For Electricity Meters

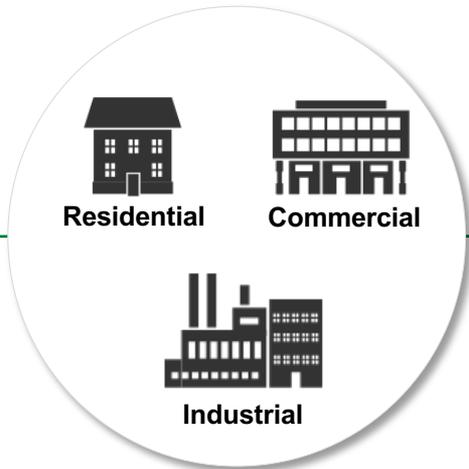
- UL 2735 : Safety standard for Electric Utility Meters.
- IEC 62052 Series: Electricity metering equipment (AC) - General requirements, tests and test conditions
 - Part 11: Metering equipment
 - Part 31: Product safety requirements and tests
- IEC 62059 Series: Dependability of Electrical Metering Equipment
- IEC 62053 Series: Active Energy Electrical Metering Equipment – Accuracy
- Electrostatic Discharges to IEC 61000-4-2 Contact and Air Discharges
- Fast Transient Burst Test to IEC 61000-4-4
- Fast Transient Surge Test to IEC 61000-4-5 Impulse Voltage

Smart Meters Key to Advanced Energy Management

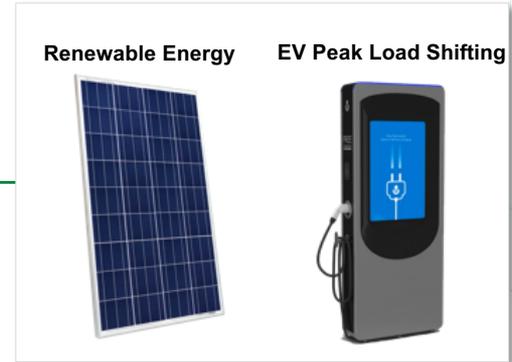
Smart Home



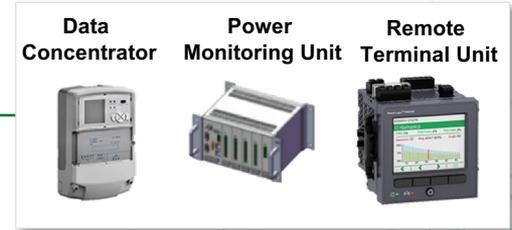
Smart Meters



Distributed Generation & Storage



Medium Voltage or Low Voltage Substations



Littelfuse: Strategic Supplier & Design Partner

- Littelfuse provides critical functional components for smart meters
+ application expertise + guidance in product selection
- Assistance with global standards and compliance requirements
- System-level design support and testing assistance
- High-volume manufacturing with highest quality standards

Global delivery network with localized distribution & customer support



Expertise Applied | Answers Delivered

<https://www.littelfuse.com>